CLAIMS

1. An erosion resistant coating, comprising:

a matrix comprising cobalt chromium, wherein the cobalt is at about 4 to about 12 weight percent, and the chromium is at about 2 to about 5 weight percent, wherein the weight percents are based on a total weight of the coating; and

a plurality of tungsten carbide grains embedded in the cobalt chromium matrix, wherein the grains are less than about 2 microns in diameter.

2. The erosion resistant coating of Claim 1, wherein the plurality of tungsten carbide grains have the diameter of about 0.3 microns to about 2 microns.

3. The erosion resistant coating of Claim 1, wherein the plurality of tungsten carbide grains have the diameter of about 0.4 to about 1 micron.

4. The erosion resistant coating of Claim 1, wherein the erosion resistant coating is formed by a high velocity oxy fuel process or a high velocity air fuel process that can achieve average particle temperatures between about 1,500°C and about 1,700°C while maintaining average particle velocity above 600 meters per second.

5. The erosion resistant coating of Claim 1, wherein the erosion resistant coating is formed by a high velocity oxy fuel process or a high velocity air fuel process that can achieve average particle temperatures between about 1,500°C and about 1,600°C while maintaining average particle velocity above 700 meters per second.

6. The erosion resistant coating of Claim 1, wherein the erosion resistant coating has a thickness greater than about 500 microns and is deposited with a high velocity air fuel process.

7. A hydroelectric turbine component having the coating of Claim 1.

8. A hydroelectric turbine component exposed to silt particles during operation thereof, the hydroelectric turbine component comprising:

an erosion resistant coating on a surface of the hydroelectric turbine component formed by a high velocity air fuel process, the erosion resistant coating comprising a matrix comprising cobalt chromium, wherein the cobalt is at about 4 to about 12 weight percent, and the chromium is at about 2 to about 5 weight percent, wherein the weight percents are based on a total weight of the coating, and a plurality of tungsten carbide grains embedded in the cobalt chromium matrix, wherein the grains are less than about 2 microns in diameter.

9. The hydroelectric turbine component of Claim 8, wherein the cobalt and the chromium provide a total amount of about 6 to about 14 weight percent, based on the total weight of the coating.

10. The process according to Claim 8, wherein the hydroelectric turbine components comprises Francis runners, Francis guide vanes, Francis check plates, Francis rotating and stationary seals, Francis draft tube, Pelton needles, Pelton seats, Pelton beaks, Kaplan blades and Kaplan discharge rings.

11. A process for improving erosion resistance of a surface of a metal substrate, comprising thermally spraying a powder comprised of tungsten carbide and cobalt chromium by a high velocity air fuel process to form grains of the tungsten carbide in a cobalt chromium matrix, wherein the tungsten carbide grains are less than about 2 microns in diameter, wherein the cobalt is at about 4 to about 10 weight percent, and the chromium is at about 2 to about 5 weight percent, and wherein a total amount of the cobalt and the chromium is at about 6 to about 14 weight percent, wherein the weight percents are based on a total weight of the coating.

12. The process according to Claim 11, wherein high velocity air fuel process comprises exposing the powder to a temperature below a melting point of the powder and at a velocity sufficient to bond the powder to the surface.

13. The process according to Claim 11, wherein the powder further comprises tungsten carbide grains having a diameter of about 0.3 micrometers to about 2 micrometers.

14. The process according to Claim 11, wherein the matrix has a thickness greater than 1,000 microns.